

Appl. No. 10/038,916

Reply to Office Action of October 31, 2007

REMARKS/ARGUMENTS**Status of the Claims**

Claims 1 to 16, 18 to 32, 34 to 38, 40 and 41 are still pending in the application.

Amendments to the Claims

Claim 36 has been amended to replace the expression "generating pilot symbols from an Orthogonal Frequency Division Multiplexing (OFDM) frame" with the expression "determining a channel response from an Orthogonal Frequency Division Multiplexing (OFDM) frame" in the preamble of the claim. In addition, in the processing step, the word "in" has been replaced with "on" and the expression "as a recovered encoded fast signalling message" has been added. In the re-encoding step, the expression "generate pilot symbols" has been replaced with "produce known pilot symbols". The "recovering" step has been replaced with a "determining" step. These amendments have been made for consistency with the description at pages 25, line 23 to page 27, line 10 and with corresponding receiver claim 41.

In claim 37, the expression "scattered pattern" has been replaced with "scattered pilot pattern" and the expression "recover channel response" has been replaced with "recover the channel response".

In claim 38, the dependency of the claims has been changed from claim 35 to claim 36 to correct a typographical error. Also, in the last clause of the claim the expression "re-encoding the recovered fast signalling message comprises" has been added to the claim to avoid confusion as to whether "re-encoding the fast signalling message using Forward Error Correction coding to generate the encoded fast signalling message, and re-encoding the encoded fast signalling message using D-STBC" are additional steps of the method or part of a step previously defined in independent claim 36.

Appl. No. 10/038,916

Reply to Office Action of October 31, 2007

Claim 40 has been amended by including elements that define physical structure of the transmitter including an encoder and at least one transmit antenna, and further defining how the elements are used to practice the claimed invention.

Claim 41 has been amended by including elements that define physical structure of the receiver including at least one receive antenna, a soft decoder and an encoder and further defining how the elements are used to practice the claimed invention.

Claim Objections

In paragraph 3 of the detailed action, the Examiner has objected to the incorrect claim dependency in claim 38. Method claim 38 has been amended to be dependent upon method claim 36.

Claim Rejections – 35 U.S.C. Section 112

In paragraph 6 of the detailed action, the Examiner rejected claim 40 as failing to define the invention in the manner required by 35 U.S.C. 112.

Claim 40 has been amended as described above to include physical structure so as to present a complete operating device. Claim 41 has been similarly amended.

The Examiner is respectfully requested to withdraw the 35 U.S.C. 112 rejection.

Claim Rejections – 35 U.S.C. 103

The law on obviousness under 35 U.S.C. 103 was recently addressed in *KSR Int'l v. Teleflex, Inc.*, No. 04-1350, slip op. at 14 (U.S., Apr. 30, 2007). Following this, examination guidelines were released by the USPTO on October 10, 2007 in regards to determining obviousness under 35 U.S.C. 103. According to these guidelines, the framework for the objective analysis for determining obviousness under 35 U.S.C. 103 is stated in *Graham v. John Deere Co.* 383 U.S. 1,148 USPQ 459 (1966). Obviousness is a question of law based on underlying factual inquiries. The factual inquiries enunciated by the Court are as follows:

- (1) Determining the scope and content of the prior art;

Appl. No. 10/038,916

Reply to Office Action of October 31, 2007

(2) Ascertaining the differences between the claimed invention and the prior art; and

(3) Resolving the level of ordinary skill in the pertinent art.

The Graham factors, including secondary considerations when present, are the controlling inquiries in any obviousness analysis. Once the findings of fact are articulated, Office personnel must provide an explanation to support an obviousness rejection under 35 U.S.C. 103.

According to KSR, for the Patent Office to properly combine references in support of an obviousness rejection, the Patent Office must identify a reason why a person of ordinary skill in the art would have sought to combine the respective teachings of the applied references.

Applicant's analysis below demonstrates that the Examiner has failed to properly conform to the aforementioned guidelines for a finding of obviousness under 35 U.S.C. 103.

In paragraph 8 of the detailed action, the Examiner has rejected claims 1 and 11 under 35 U.S.C. 103(a) as being unpatentable over ten Brink (US Patent 6,611,513) in view of Stein (USP 6,175,590) and Lucas (USP 5,448,600) and further in view of Balachandran et al. (USP 6,215,827).

Claim 1

Missing Elements

The following is a discussion of why the cited references do not disclose all the elements of the rejected claim. While it may be considered that "the mere existence of differences between prior art and an invention does not establish the invention's non-obviousness", Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one skilled in the art (Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR international Co. v. Teleflex Inc.*, published in Federal Register Vol. 72, No. 195 October 10, 2007). As such, if elements from a claim are not disclosed by the combination of cited references and no valid reasoning is provided why the missing elements would be obvious, this may provide a strong basis for why a claim should not be rejected based on obviousness.

Appl. No. 10/038,916

Reply to Office Action of October 31, 2007

The Examiner has alleged that newly cited reference Lucas discloses the limitation of "a correlator adapted to produce a channel quality indicator" in Figure 1, in the form of elements 10, 20 and 30 and at col. 5 lines 15-27 and 33-35.

Lucas discloses a method for selecting multiple propagation paths retained for messages transmitted in a CDMA radio communication system, each path being identified by a delay which is applied to at least one spreading sequence for determining a correlation between the received signal and said spreading sequence (column 2, lines 61-67).

Lucas discloses a rake receiver having two data reception arms 10,20 and a search arm 30. The search arm has a single correlator, indicated by reference character 33 in Figure 1, in which a received signal is correlated with a delayed version of a pilot spreading code C_p known to be used in the received signal.

The output of correlator 33 is disclosed to represent "an estimation of the channel response along the tested path" (col. 5, lines 43-44). However, Applicant submits that an estimation of a channel response in the manner it is disclosed in Lucas does not correspond to "a channel quality indicator" as recited in the present claims. As indicated on page 17 of the present application, a "Channel Quality Indicator" (CQI) provides an overall assessment of the quality of the channel, including the effects of interference, multi-path fading, and Doppler spread. Applicant submits that the correlation of a received signal with a spreading code known to be used in the received signal that is delayed by an estimated delay value, as disclosed in Lucas, provides an assessment of the delay of the received signal, i.e. the accuracy of the estimated delay applied to the spreading code compared to the amount of actual delay incurred by the received signal. This may allow for better delay estimates to be made for a given channel and improve the probability of receiving a signal. However, it does not provide an indication of the quality of the channel. Applicant submits that a high correlation value is indicative of an appropriate selection of estimated delay value D applied to pseudorandom generator 31 (as indicated in Figure 1) with respect to the received signal. Therefore, Applicant submits that a high correlation value output from correlator 33 is explained as an indication of appropriate selection of the delay value with respect to the received signal, and not as an indication of the overall quality of the channel. The size of a delay incurred by the channel, whether large or small, may not have a direct correlation

Appl. No. 10/038,916

Reply to Office Action of October 31, 2007

to the overall channel quality. For example, a channel with a small delay may still have a poor channel quality related to other factors and a channel with a large delay may have a high quality channel, despite a large delay.

Furthermore, Lucas does not disclose that the correlator is adapted to produce a channel quality indicator "by determining a correlation between the sequence of soft data element decisions and the re-encoded output sequence".

With respect, the Examiner seems to be citing Lucas based on the disclosure of a correlator whose output represents "an estimation of the channel response along the tested path". Stein discloses a correlator, indicated by reference character 234 in Figure 1, which was relied upon by the Examiner previously to disclose "a correlator adapted to produce a channel quality indicator". Applicant submits that the correlator 33 disclosed by Lucas does not disclose any specific features that are significantly different than the correlator disclosed in Stein. As such, it is unclear to the Applicant why a correlator disclosed in a newly cited reference that is not significantly different than that disclosed in a previously cited reference, which is now conceded by the Examiner not to teach the limitation in question, would be considered to disclose the limitation. Applicant submits that this is especially true as the newly cited reference does not include limitations that one skilled in the art would at least consider relevant to the presently claims subject matter that may at least suggest a reason to combine Lucas with other references, limitations such as re-encoding of a decoded output sequence and feeding back to a transmitter of any channel quality indicator. Therefore, despite Lucas' disclosure of a correlator whose output represents "an estimation of the channel response along the tested path", Applicant submits that Lucas is in fact less relevant than the Examiner's former citation of Stein.

For at least the reasons discussed above, Applicant respectfully submits that the combination of ten Brink, Stein, Lucas and Balachandran et al. do not teach all the limitations recited in amended claim 1. Furthermore, the Examiner has failed to explain why the missing limitation would be obvious to one skilled in the art. Without all the limitations of claim 1 being disclosed by the two references and no reason provided by the Examiner why these missing limitations would be obvious, it is not reasonable to expect one skilled in the art to arrive at the claimed invention.

Appl. No. 10/038,916
Reply to Office Action of October 31, 2007

Reason to Combine

Once the scope of the prior art is ascertained, the content of the prior art must be properly combined. An obviousness inquiry requires review of a number of factors, including the background knowledge possessed by a person having ordinary skill in the art, to determine whether there was an apparent reason to combine the elements of the prior art in the fashion claimed by the present invention. For the Patent Office to combine references in support of an obviousness rejection, the Patent Office must identify a reason why a person of ordinary skill in the art would have combined the references *KSR Int'l v. Teleflex, Inc., No. 04-1350, slip op. at 14 (U.S., Apr. 30, 2007)*, *Id.* at 15. Even if the Patent Office is able to articulate and support a suggestion to combine the references, it is impermissible to pick and choose elements from the prior art while using the application as a template.

Applicant submits that there is no suggestion of a desirability of the claimed invention in any of the references that would serve as a reason for one skilled in the art to combine the collection of references identified by the Examiner. On the contrary, Applicant submits that there are several reasons that the references would not be considered suitable for combining, as will be discussed in detail below.

To begin, Applicant submits that the relevance of the ten Brink reference is not clear. The reference relates to iterative de-mapping of a received signal. There is no re-encoding of a decoded output sequence in the matter claimed, and there is no feeding back of any channel quality, both of which are conceded by the Examiner on page 5 of the Office Action.

Furthermore, with respect to Lucas, Applicant submits that the Examiner has taken the disclosure of the correlator and its intended use out of the context. As Lucas does not recite the correlator is adapted to produce a channel quality indicator "by determining a correlation between the sequence of soft data element decisions and the re-encoded output sequence", and as there is no suggestion or disclosure of applying what is recited in Lucas in a manner recited in the present claims, Applicant submits that one skilled in the art would not consider the disclosure in Lucas in combination with the other cited references.

Appl. No. 10/038,916

Reply to Office Action of October 31, 2007

The Examiner's motivation for combining ten Brink, Stein and Lucas set out at the middle of page 6 with respect to the limitation of "a correlator adapted to produce a channel quality indicator" alleged to be disclosed by Lucas, are tied to his view that Lucas teaches this limitation. As detailed above, this was an incorrect interpretation of Lucas, and as such this also affects the Examiner's motivation argument.

The Examiner explains the alleged reason for combining ten Brink, Stein and Lucas with Balachandran at the bottom of page 6 and the top of page 7 of the current Office Action. It is alleged that Balachandran discloses transmitting a channel quality indication to a transmitter for use in determining and applying an appropriate coding rate and modulation. However, as described above, Lucas does not disclose determining a channel quality indicator. Thus, if one were to combine Lucas with Stein and Balachandran (assuming there would be any motivation for such a combination, which Applicant does not concede), it seems that a person skilled in the art would feedback a value that is a function of the correlator disclosed by Lucas to the transmitter. However, as the correlation value is related to the amount of delay experienced in a given channel, Applicant submits that it is unclear how the feedback would be used in determining and applying an appropriate coding rate and modulation. Combining Lucas with Stein and Balachandran does not yield the claimed invention because of the missing step of using the correlation result as a channel quality indicator and feeding back the channel quality indicator to the transmitter for use in determining and applying an appropriate coding rate and modulation is not disclosed by the combination of references as claimed.

On page 7 of the current Office Action, the Examiner states that it would have been obvious to combine ten Brink, Stein and Lucas with Balachandran because the channel quality determination feedback to the transmitter can allow efficient and accurate rate adjustment of the transmission of the coded communication data signal. As discussed above, Lucas does not disclose producing a channel quality indicator. Applicant submits without citing a reference operable to produce a channel quality indicator in a manner that is consistent with embodiments of the present invention, in particular as recited in independent claim 1, there is no reason to combine a further reference (for example Balachandran et al.) that is alleged to disclose the

Appl. No. 10/038,916

Reply to Office Action of October 31, 2007

limitation of transmitting a channel quality indicator to the transmitter for use in determining and applying an appropriate coding rate and modulation.

Furthermore, it is an objective of Stein to minimize overhead. See column 6, lines 47-54, where the reason for not signalling the rate used for transmission, thereby requiring blind rate detection in the receiver, is established as avoiding the requirement of additional overhead bits. Thus, the additional overhead required by the Balachandran et al. approach of feeding back information to a transmitter would be something to be avoided in the system of Stein.

On the basis of the above, Applicant respectfully submits the Examiner has not provided a reason why a person of ordinary skill in the art would have combined the references. On this basis the Examiner is respectfully requested to withdraw the rejection of claim 1 under 35 U.S.C. 103(a).

Similar arguments apply to claim 11, and as such the Examiner is respectfully requested to withdraw the rejection of claim 11 under 35 U.S.C. 103(a).

Claims 2-10 and 12-16

Claims 2-10 and 12-16 have been rejected in view of at least the combination of ten Brink, Stein and Lucas and for some of the claims, further in view of additional references. As these claims are dependent on claim 1 or claim 11, either directly or indirectly, Applicant submits that these claims should be patentable at least for the same reasons discussed above pertaining to claims 1 and 11.

The Examiner is respectfully requested to withdraw all remaining 35 U.S.C. 103 rejections of the claims.

Claim 36

In paragraph 15, the Examiner has rejected claim 36, under 35 U.S.C. 103(a) as being unpatentable over Agee et al. (USP 6,621,851) in view of Tiedemann, JR et al. (US Pub. 2006/0094460).

Appl. No. 10/038,916

Reply to Office Action of October 31, 2007

The Examiner submits that Agee et al. discloses "processing the encoded symbols based in a scattered pilot pattern to recover the encoded fast signalling message". Amended claim 36 is directed to "a method of determining a channel response from an Orthogonal Frequency Division Multiplexing (OFDM) frame received at an OFDM receiver, the OFDM frame containing an encoded fast signalling message in the form of encoded symbols within the OFDM frame". Applicant submits that the portions of Agee et al. cited by the Examiner discloses generally how the discrete multitone stacked carrier scheme operates (col. 7, lines 54-64), how a channel estimate can be performed using a pilot signal (col. 17, lines 50-60), how to perform a frequency domain to time domain transformation (col. 23, lines 31-37) and how selected tones within a tone set are designated as pilots and are distributed throughout the frequency band (col. 23, lines 61 to col. 24, line 2). Applicant submits that Agee et al. does not suggest or disclose an OFDM frame containing an "encoded fast signalling message" as recited in the preamble of claim 36 or the step of "processing the encoded symbols based on a scattered pilot pattern to recover the encoded fast signalling message" (emphasis added).

For at least the reason discussed above, Applicant respectfully submits that Agee et al. does not teach all the limitations which are alleged to be disclosed by the Examiner with regard to claim 36. Even if Teidemann JR. et al. does teach the limitations which are missing from Agee et al., which Applicant does not concede, Applicant submits that the Examiner has failed to provide a suitable reason for combining the references in view of Agee et al. not disclosing limitations relied upon in the Examiner's present rejection. Without all the limitations of claim 36 being disclosed by the two references and no reason provided by the Examiner why these missing limitations would be obvious, Applicant respectfully submits that the Examiner has failed to provide a suitable reason for combining Agee et al. and Teidemann JR. et al..

The Examiner is respectfully requested to withdraw the anticipation rejection of claim 36.

Claim Rejections – 35 U.S.C. 102

Controlling case law has frequently addressed rejections under 35 U.S.C. § 102. "For a prior art reference to anticipate in terms of 35 U.S.C. Section 102, every element of the claimed invention must be identically shown in a single reference." Diversitech Corp. v. Century Steps,

Appl. No. 10/038,916

Reply to Office Action of October 31, 2007

Inc., 850 F.2d 675, 677, 7 U.S.P.Q.2d 1315, 1317 (Fed. Cir. 1988; emphasis added). The disclosed elements must be arranged as in the claim under review. See Lindemann Machinefabrik v. American Hoist & Derrick Co., 730 F.2d 1452, 1458, 221 U.S.P.Q. 481, 485 (Fed. Cir. 1984). If any claim, element, or step is absent from the reference that is being relied upon, there is no anticipation. Kloster Speedsteel AB v. Crucible, Inc., 793 F.2d 1565, 230 U.S.P.Q. 81 (Fed. Cir. 1986; emphasis added). The following analysis of the present rejections is respectfully offered with guidance from the foregoing controlling case law decisions.

In paragraph 17 of the detailed action the Examiner has maintained the rejection of claims 40 and 41 as being anticipated by Thomas et al. The Examiner's statement in paragraph 2 that the arguments for claims 40 and 41 are considered moot in view of the new grounds of rejection is not correct as the objection to claims 40 and 41 is based on the same objection as the previous Office Action, which does not include the newly cited reference Lucas.

In the Office Action of May 24, 2006, the Examiner equated the following items with regard to claim 40:

a pilot = redundancy bits added to block signal constellation; and
transmission parameter = input bits.

With all due respect, while the Examiner is entitled to give claim limitations a broad interpretation, this should not be taken to give terms meanings other than their clear meaning. A "pilot" is well known in OFDM to be a transmitted symbol that usually contains known information that is used by the receiver to perform channel estimation. The redundancy bits referred to by the Examiner have nothing to do with channel estimation or pilots. As for the equating of transmit parameter signalling (TPS) with "input bits", TPS is defined in the specification on page 6 to be symbols that are "used to provide common signalling channels to allow fast physical and media access control layer adaptation signalling". The Examiner has not referred to anything of this sort in the reference.

Appl. No. 10/038,916
Reply to Office Action of October 31, 2007

The Examiner refers to paragraphs [0091] and [0092] as discussing the use of pilots for channel estimates, but with all due respect these paragraphs have nothing to do with pilots or performing channel estimation.

On this basis it is considered that the Examiner has erred in rejecting claims 40 and 41 under 35 U.S.C. 102(e). The Examiner is respectfully requested to withdraw the rejection of claims 40 and 41.

In view of the foregoing, early favourable consideration of this application is earnestly solicited.

Respectfully submitted,

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